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INFLUENCE OF MINERAL AND ORGANIC NITROGEN ON TUBER DRY MATTER AND SPECIFIC GRAVITY OF POTATOES

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Introduction

Dry matter percentage (DM%) is an important qualitative characteristic of potato tubers. Frequently N fertilisation significantly affects DM% but there have been several studies differing in their results. According to Jenkins and Nelson (1992), numerous published reports indicate a reduction in DM%, others show no effects of N and some recorded instances where final DM% increases significantly as N rate increases. The DM% is normally estimated by the specific gravity (SG), despite some known limitations.

The influence of mineral and organic N fertilising on dry matter content of the cv. Desirée, the most important variety in Portugal, was studied during three years (1995-1997). For the last two years (1996-1997), specific gravity was also determined. The relationship between the specific gravity and the dry matter content of tubers was established and analysed.

Methods

The field experiments were set up in Bragança (north-east Portugal) in a soil of loamy texture and neutral reaction. Phosphorous and potash were applied in accordance with the fertiliser recommendation. The amount of nitrogen applied varied between 0 and 300 kg ha⁻¹ as urea. Three types of organic fertilisers were also used, separately: poultry manure (PM), cow manure (CM) and town waste compost (TWC), in an amount equivalent to 100 kg ha⁻¹ of nitrogen. The N content of the different organic fertilisers were 17, 27 and 15 g N kg⁻¹ DM in 1995, 40, 12 and 17 in 1996 and 35, 17 and 12 in 1997, respectively for PM, CM and TWC. All fertilisers were applied at planting. The experiment was designed in completely random blocks, with three replications.

The DM% was evaluated by drying 1,5 kg of several fractions of tubers, in an oven with forced air circulation, regulated to 65 °C. The specific gravity was determined by using a "Zeal" potato hydrometer.

Results

The results are presented in the table and figure.

Table - Effect of N dosis and source on DM% of tubers

N dose (kg ha ⁻¹)	Mean % dry matter		
	1995	1996	1997
0	20,4 a*	21,9 cd	19,9 a
50	22,2 a	24,0 a	20,9 a
100	19,9 a	23,6 ab	20,5 a
150	20,8 a	----	----
200	20,4 a	21,9 cd	21,3 a
300	----	21,8 d	20,0 a
100 (PM)	20,5 a	24,1 a	21,1 a
100 (CM)	21,7 a	22,4 bcd	19,5 a
100 (TWC)	21,3 a	23,1 abc	19,8 a

(*) - In the same column, the means followed by the same letter do not differ significantly from the Fisher's LSD (< 0,05) test.

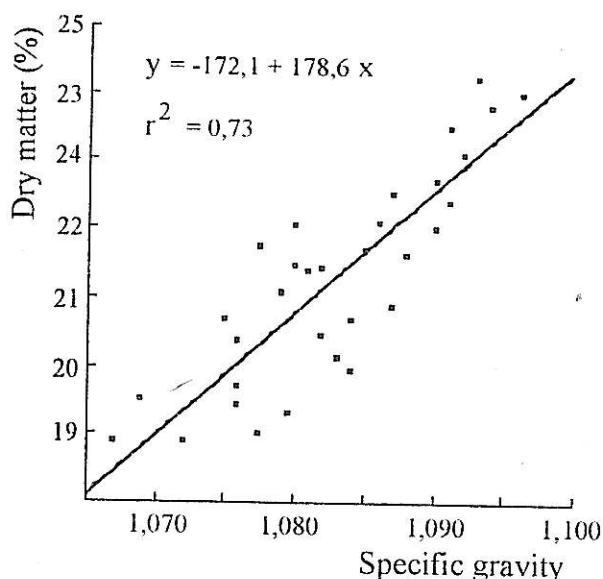


Figure - Relationship between the specific gravity and the dry matter content of potato tubers.

Discussion

The highest values of DM% were obtained with moderate doses of N, although the effect was only significant in 1996 (table). The maximum DM% was obtained with 50 kg ha⁻¹. Considering this result, there seems to be some difficulty in managing the nitrogen fertilisation to maximize simultaneously the DM% and the production. *Julia*

Values of DM% obtained with OF were always to the 0 and 50 kg N ha⁻¹ treatments. Nevertheless, among OF, a slight increase in DM% was observed with the increase of the manure N content, which may be a consequence of the differences in their contributions to the crop N nutrition.

The linear regression between SG and DM% across the two years of data, presents different parameters on those previously published studies (Kleinkopf et al., 1987; Almeida, 1995). When the data were observed each year separately the regression was always very poor. Since some of the factors that affect the relationship, such as variety, soil type and crop husbandry, were kept constant over the years, the lack of significance may be due to the infection of the tubers with common scab, which was observed in all the years. The presence of this disease on the skin of the tubers can be a great limitation in the use of SG as an estimate of the DM%.

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